State of New Jersey

DEPARTMENT of ENVIRONMENTAL PROTECTION

CHRIS CHRISTIE
Governor

KIM GUADAGNO
Lt. Governor

BOB MARTIN
Commissioner

Division of Air Quality
Bureau of Air Permits
401 E. State Street, 2nd floor, P.O. Box 27
Trenton, NJ 08625-0027

FACT SHEET

FOR

West Deptford Energy, LLC

Paradise Rd, West Deptford Twp, NJ 08086

Program Interest (PI) Number: 56078

Permit Activity Number: BOP100003

APPLICATION
FOR
MODIFICATION TO TITLE V AIR OPERATING PERMIT
AND
EXTENTION
OF
PREVENTION OF SIGNIFICANT DETERIORATION PERMIT

Yogesh Doshi, Supervisor
Bureau of Air Permits
June 8, 2010

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ATTACHMENT

MEMORANDUM OF THE AIR DISPERSION MODELING AND RISK ASSESSMENT SUMMARY DATED DECEMBER 23, 2008, AND,
MEMORANDUM FOR THE UPDATED DISPERSION MODELING FOR NO_2 DATED MAY 27, 2010.

A. PERMIT EXTENSION APPLICATION

On February 11, 2009, the Department originally issued air pollution control and Prevention of Significant Deterioration (PSD) permit to West Deptford Energy, LLC (WDE), to construct and operate West Deptford Energy Station (WDES), a nominal 600 megawatt (MW), a maximum 616 MW (summer operating conditions), combined-cycle power generating facility located in the township of West Deptford, NJ. The permit became effective on March 11, 2009.

This source was determined to be subject to PSD requirements for emissions of nitrogen dioxide (NO_2), carbon monoxide (CO), sulfur dioxide (SO_2), and particulate matter (PM), particulate matter with an aerodynamic diameter less than 10 microns (PM_{10}) and particulate matter with an aerodynamic diameter less than 2.5 microns ($PM_{2.5}$).

The PSD permit will expire on September 11, 2010, if construction of the facility is not commenced by that date. In accordance with PSD regulations codified in the Code of Federal Regulations, at 40 CFR 52.21(r)(2), West Deptford Energy, LLC filed a request on March 11, 2010 to extend WDES's PSD permit by eighteen months so that the facility will have additional eighteen months to commence construction.

The revised application submitted by WDE includes:

- A Regulatory and Control Technology Update which discuses changes to regulations since issuance of February 2009 permit . The discussion addresses changes to Revised National Ambient Air Quality Standards for NO2, Greenhouse Gas Emissions Reporting Rule and National Emission Standards for Hazardous Air Pollutants – Subpart ZZZZ .

- A revised Best Available Control Technology (BACT), and a Lowest Achievable Emission Rate (LAER) analysis to show that the emission levels and the control apparatus in the WDES permit are still BACT and LAER for the respective criteria pollutants for the permitted equipment at WDES.

- An updated Dispersion Modeling for NO_2 to address the new hourly National Ambient Air Quality Standard (NAAQS) that became effective on April 12, 2010.

- A list of activities undertaken for the construction of WDES, which shows their intent to commence construction of WDES.

WDE is not proposing any changes to the proposed facility or to its Air pollution control permits in their application. However, on March 3, 2010, EPA issued a final rule for the National Emission Standards for Hazardous Air Pollutants (NESHAP) for reciprocating internal combustion engines (RICE) – Subpart ZZZZ, according to which RICE located at an area source of HAP emissions must meet the requirements of Subpart ZZZZ by meeting the requirements of 40 CFR Part 60, Subpart IIII. Hence, the following requirement is being added by the Department to the permit conditions at OS Summary level for the 750-kW emergency generator (emission unit U3) and the 300-hp firewater pump (emission unit U4).

“A new or reconstructed stationary RICE located at an area HAP source must meet the requirements of 40 CFR 63 by meeting the requirements of 40 CFR 60 Subpart IIII, for compression ignition engines or 40 CFR 60 Subpart JJJJ, for spark ignition engines. No further requirements apply for such engines under 40 CFR 63.”

B. PROJECT AND FACILITY DESCRIPTION

The WDES facility will consist of two combined cycle combustion turbine generators, two duct-fired heat recovery steam generators (HRSG), two steam turbine electric generators, two 5-cell wet mechanical cooling towers, and ancillary equipment.

Each turbine will be exhausting through a 210 foot exhaust stack. The primary fuel for the combustion turbine and duct burner will be natural gas. Ultra Low Sulfur Distillate (ULSD) oil with sulfur content of less than or equal to 15 ppm will be back up fuel for combustion turbine only. Each of the combustion turbines will have a maximum heat input rate of 2,262 MMBtu/hr Higher Heating Value (HHV) (not including supplemental duct-firing) when firing natural gas, and a maximum heat input rate of 2,706 MMBtu/hr HHV with supplemental duct-firing when firing natural gas, and a maximum heat input of 2,270 MMBtu/hr HHVwhen firing ULSD fuel oil.

Ancillary equipment will include a 40 MMBtu/hr auxiliary boiler that will operate on natural gas exclusively during generating unit standby in order to reduce generating unit startup duration, a 750 KW (7.0 MMBtu/hr HHV) emergency diesel engine-driven generator, and a 300 HP (2.1 MMBtu/hr HHV) diesel engine-driven fire pump, both of which will be operated only as required to perform necessary reliability testing during actual emergencies. Auxiliary equipment also includes storage tanks, and two cooling towers. The emergency diesel-fired generator and fire pump will use ULSD fuel oil.

WDES being situated adjacent to the Gloucester County Utilities Authority (GCUA) sewage treatment plant will use treated effluent diverted from the GCUA river discharge for non-contact cooling tower makeup, for boiler feed-water and for plant service water. Cooling tower blowdown and process wastewater will be discharged back into the GCUA river outfall pursuant to an individual NJPDES permit

C. AIR CONTAMINANT EMISSIONS

Table 1 lists proposed emissions of all criteria pollutants in pounds per hour (lbs/hr), parts per million on dry volume basis at 15% oxygen (ppmdv @ 15% O2), and pounds per million British thermal units (lbs/MMBtu). The proposed emission limits from the combustion turbines will be achieved after the application of air pollution control technologies that are discussed in Section C.

TABLE 1

MAXIMUM ALLOWABLE EMISSIONS FOR EACH COMBUSTION TURBINE/HRSG UNIT
(Operating Conditions: 100% load; - 0^0F ambient temperature)
(Baseload Operations with Supplemental Duct-firing)

Air Contaminant	Maximum Allowable Hourly Emissions Natural Gas	ULSD
Nitrogen Oxides (as NO_2)		
lbs/hr[1]	22.91	34.55
ppmdv @ 15% O_2[2]	2.0	3.5
lbs/MMBtu[3]	0.01	0.017
Carbon Monoxide (CO)		
lbs/hr	13.95	18.03
ppmdv @ 15% O_2	2.0	3.0
lbs/MMBtu	0.006	0.009
Non-Methane organic Compounds (including VOCs)		
lbs/hr	7.59	13.77
ppmdv @ 15% O_2	1.9	4.0
lbs/MMBtu	0.003	0.007
Sulfur Oxides (SO_2)		
lbs/hr	5.66	4.64
lbs/MMBtu	0.002	0.002
Total Suspended Matter (TSP)		
lbs/hr	10.44	17.0
lbs/MMBtu	0.006	0.016
PM_{10}		
lbs/hr	18.66	34.0
lbs/MMBtu	0.012	0.031
$PM_{2.5}$		
lbs/hr	18.66	34.0
lbs/MMBtu	0.012	0.031
Ammonia (NH_3)		
ppmdv @ 15% O_2	5.0	5.0
lbs/MMBtu	0.009	0.009
Sulfuric Acid (H_2SO_4)		
lbs/hr	0.85	0.70
Formaldehyde		
lbs/hr	0.58	0.57

NOTES:
1. lbs/hr = Pounds per hour emissions per turbine.
2. ppmvd (@ 15% O_2) = parts per million by volume on a dry basis (corrected to 15 percent oxygen).
3. lbs/MMBtu (HHV) = Pounds of contaminant per million BTU (HHV) heat input at higher heating value (HHV) of the fuel based on worst-case normal operating conditions.

Table 2 shows that the Facility is subject to federal Prevention of Significant Deterioration (PSD) requirements. Based on the emissions in Table 2, WDES is considered a new major PSD source as the proposed potential annual emissions for Carbon Monoxide (CO) and Nitrogen Oxides (NO_x) are greater than 250 tpy, the applicability threshold for major stationary sources that are not one of the 28 named source categories in 40 CFR 52.21.

In addition, the source was determined to be subject to Non-Attainment New Source Review (NSR) for emissions of NO_x and VOC. This is because the potential emissions of NO_x and VOC, which are ozone precursors, are greater than 25 tons per year (the threshold for a severe ozone non-attainment area, which applies to the entire state of New Jersey).

TABLE 2
Potential Emissions, PSD Significant Emission Rate and Non-attainment NSR Thresholds

Pollutant	Proposed Maximum Potential Emissions from WDES (TPY)[1]	PSD Significant Emission Rate (TPY)	Non-Attainment NSR Threshold Criteria (TPY)
Carbon Monoxide (CO)	703.16	100	100
Nitrogen Oxides (NO_x)	302.74	40	25
Sulfur Dioxide (SO_2)	35.32	40	N/A
Particulate Matter (PM/TSP)	58.39	25	N/A
PM-10	99.33	15	N/A
PM-2.5	96.12	15	100
Ozone (Volatile Organic Compounds (VOC))	94.69	40	25
Lead	0.017	0.6	N/A
Sulfuric Acid Mist	5.31	7	N/A

NOTE:
[1] Maximum potential emissions based on the following:

- Worst case potential to emit calculations are based on the following operating scenarios for two turbines and associated duct burners:
  - Scenario 1: 5,200 hours of natural gas-fired combustion turbine operation plus 900 hours of natural gas-fired start-up/shutdown operation, and 3,000 hours of natural gas-fired duct burning operation (and no oil fired operation).
  - Scenario 2: 5,600 hours of natural gas-fired combustion turbine operation plus 750 hours of natural gas-fired start-up/shutdown operation, 350 hours of oil-fired combustion turbine operation and 150 hours of oil-fired start-up/shutdown operation.
  - Scenario 3: 6,900 hours of natural gas-fired combustion turbine operation plus 900 hours of natural gas-fired start-up/shutdown operation (and no duct burner operations or oil firing).
  - Scenario 4: 3,950 hours of natural gas-fired combustion turbine operation plus 750 hours of natural gas-fired start-up/shutdown operation, 350 hours of oil-fired combustion turbine operation plus 150 hours of oil-fired start-up/shutdown operation, and 3,000 hours of natural gas-fired duct burning operation.
- Two cooling towers: 8760 hrs per year;
- Auxiliary boiler: 4,600 hours per year on natural gas, and,
- Limited operation of diesel firewater pump and emergency generator, which include proposed annual usage limitation.

The Hazardous Air Pollutant (HAP) emissions from the project are included in Attachment (memorandum of the air dispersion modeling and risk assessment summary from Bureau of Technical Services).

D. AIR POLLUTION CONTROL TECHNOLOGIES

The facility is required to evaluate Best Available Control Technology (BACT) for each PSD pollutant (NO_x, Ozone (VOC), PM, PM_{10}, $PM_{2.5}$) and Lowest Achievable Emission Rate (LAER) for each NSR pollutant (NO_x, VOC, and $PM_{2.5}$). BACT is an emission limitation based on the maximum degree of reduction for each regulated pollutant taking into account technical feasibility, energy, economics and other environmental factors. LAER is the most stringent emission limitation contained in the implementation plan of any State for a particular source category, or which is achieved in practice by a particular source category, whichever is most stringent.

1. Nitrogen Oxide (NO_x) Control Technologies

a. Description of Control Technologies

The two major ways in which NO_x is formed in the combustion process are known as fuel NOx formation and thermal NO_x formation. Fuel NO_x is formed when nitrogen and nitrogen compounds present in the fuel combine with oxygen present in the combustion zone to form NO_x. Generally, fuel NO_x can be reduced by decreasing the amount of nitrogen in the fuel. Thermal NO_x is formed when nitrogen from the air in the combustion zone combines with oxygen in the combustion zone at high temperature. The rate of formation is proportional to temperature in the combustion chamber.

WDES evaluated the following technologies for controlling NO_x emissions from the proposed combustion turbines:

Selective Catalytic Reduction (SCR)
Water/Steam Injection
Dry Low-NO_x Combustors
Rich/Quench/Lean (RQL) Combustion
SCONOx
XONON

Selective Catalytic Reduction (SCR)

Selective catalytic reduction (SCR) is a process in which ammonia is injected directly into the flue gas and then passed over a catalyst to react with NO_x, converting the NO_x and ammonia to nitrogen and water. This reaction normally requires higher temperatures in order to take place. However, the insertion of a catalyst into the gas path of the HRSG allows this reaction to take place at a lower temperature, as within the operating range of HRSG.

Water injection is a process that uses a high-pressure metering pump to inject water into the gas turbine combustors. Once injected, the water vaporizes and absorbs some of the heat of combustion. This lowers peak flame temperature which in turn reduces the amount of thermal NO_x that is formed.

Dry Low-NOx Combustors

Dry Low-NO_x (lean pre-mix) combustors stage fuel combustion, lowering flame temperatures, thus reducing the amount of thermal NO_x formation without the use of diluents such as steam or water.

WDES selected dry low-NO_x combustors, water injection (for oil firing) and selective catalytic reduction (SCR) to control NO_x emissions from the combustion turbines. SCONOx and XONON technologies were also considered. SCONOx is commercially available, but has not been applied to turbines of the size to be used by the WDES. SCONOx has been applied to a 32 MW combined cycle turbine, and is being installed on a 43 MW combined cycle turbine, XONON was not found to be commercially available at this time for turbines of the size to be used by the WDES.

b. ***Technical Review of NOx Controls***

NOx controls for Combustion Turbines

WDES has proposed to install a DLN combustion system on the combustion turbines, along with SCR to achieve an emission limitation of 2.0 ppmdv, corrected to 15% O_2 on natural gas for all normal operations. When operating on ULSD fuel oil, combustion turbines will utilize water injection to achieve an emission limitation of 3.5 ppmdv, corrected to 15% O_2 on ULSD for all normal operations (i.e., greater than 70% load). The Department has compared the proposed emission limitation with emission limitation of similar sized combustion turbines having SCR and DLN in the RACT/BACT/LAER Clearinghouse (RBLC) and found the emissions to be minimal and approvable as both BACT and LAER. SCR has been used on hundreds of gas turbine applications throughout the United States and the world, and is a proven technology for the control of NO_x emissions from gas turbines.

NOx controls for Ancillary Sources

WDES has proposed NO_x emission limitations for the auxiliary boilers, emergency diesel-fired electric generators, and emergency diesel-fired fire-water pump.

The auxiliary boiler will operate on natural gas exclusively. The NO_x emission limit for the auxiliary boiler is 0.035 lbs/MMBtu (equivalent to 1.4 lb/hr or 3.2 TPY). The auxiliary boiler would be equipped with Low NOx burners and flue gas recirculation to control NOx. WDES has proposed to take a restriction on the amount of natural gas usage for the boiler equal to 181.0 MMscf/yr, which is equivalent to a 4,600 hours annually, operating at 100 percent load.

The engine-driven emergency generator and fire-water pump will operate on ULSD exclusively. The proposed NO_x emission limit for the emergency diesel engine-driven electric generator is 10.6 lbs/hr or 2.65 TPY and, for the diesel engine-driven fire-water pump, the limit is 1.98 lbs/hr or 0.15 TPY. WDES has also proposed to take restrictions on the hours of operation for emergency diesel-fired electric generator of less than or equal to 500 hours per year and for the fire-water pump of less than or equal to 150 hours per year. The Department has reviewed these and found the proposed emission limitations to be BACT and LAER.

2. VOC Control Technologies

a. Description of Control Technologies

The most stringent VOC control levels for combustion turbines has been achieved with advanced low NO_x combustors and/or catalytic oxidation for CO control. Good combustion practices also reduce the formation of VOCs.

b. Technical Review of VOC Controls

VOC controls for Combustion Turbines

WDES is proposing the installation of an oxidation catalyst for CO control which will also reduce VOC emissions. The proposed VOC emissions limits when burning natural gas are 1.9 ppmdv corrected to 15% O_2 at 100% load with supplemental duct-firing. The proposed VOC emissions limits when burning ULSD are 4.0 ppmdv corrected to 15% O_2 at 100% load with no supplemental duct-firing. The Department has searched the RBLC for VOC emission limitations of similar sized combustion turbines and found the proposed VOC emission limitations to be BACT and LAER.

VOC controls for Ancillary Sources

WDES has proposed VOC emission limitations for the auxiliary boiler, emergency diesel-fired electric generator, and emergency diesel-fired fire-water pump. The proposed VOC emission limit for the auxiliary boiler is 0.005 lbs/MMBtu (equivalent to 0.2 lb/hr or 0.46 TPY). The proposed VOC emission limit for the emergency diesel-fired electric generator is 0.09 lbs/MMBtu (equivalent to 0.63 lbs/hr or 0.16 TPY). The proposed VOC emission limitation for the emergency diesel-fired fire-water pump is 0.35 lbs/MMBtu (equivalent to 0.74 lbs/hr or 0.055 TPY). The Department has reviewed these and found the proposed VOC emission limitations to be BACT and LAER.

3. Control Technologies for CO

a. Description of Control Technologies

An oxidation catalyst represents the most stringent level of control for combustion turbine CO emissions. Good combustion practices also reduce the formation of CO by converting CO to CO2.

b. Technical Review of CO Controls

CO controls for Combustion Turbines

WDES has proposed to install an oxidation catalyst to reduce CO emissionsThe proposed emission limitation when firing natural gas is 2.0 ppmdv corrected to 15% O_2 at 100% load, both with and without supplemental duct-firing. The proposed emission limitation when firing ULSD is 3.0 ppmdv corrected to 15% O_2 at 100% load. The Department has reviewed these and found the proposed CO emission limitations to be BACT.

CO controls for Ancillary Sources

WDES has proposed CO emission limitations for the auxiliary boiler, emergency diesel-engine-driven electric generator, and the emergency diesel engine-driven fire-water pump. The CO emission limit for the auxiliary boiler is 0.036 lbs/MMBtu (equivalent to 1.44 lb/hr or 3.22 TPY). The CO emission limitation for the emergency diesel-fired electric generator is 0.83 lbs/MMBtu (5.79 lbs/hr or 1.45 TPY). The CO emission limitation for the emergency diesel-fired fire-water pump is 0.82 lbs/MMBtu (equivalent to 1.72 lbs/hr or 0.13 TPY). The Department has reviewed these and found the emission limitations to be BACT.

4. Control Technologies for Sulfur Dioxide and Sulfuric Acid Mist

a. Description of Control Technologies

Sulfur dioxide emissions are formed from oxidation of sulfur in the fuel. A fraction of the SO_2 is further oxidized to SO_3, which in turn may react with water vapor to form sulfuric acid mist. The only practical means for controlling SO_2 emissions from combustion turbine projects is to limit the sulfur content of the fuel. Add-on controls are technically and economically infeasible due to the high flows and very low concentrations of sulfur in the flue gas.

The New Source Performance Standard (NSPS) sulfur content limit for combustion turbines (40 CFR Subpart KKKK) in natural gas is 20 grains sulfur/100 SCF and 0.06 lb SO_2/MMBtu in liquid fuel.

b. ***Technical Review of SO_2 Controls***

SO_2 controls for Combustion Turbines

WDES is proposing natural gas and ULSD, both inherently low sulfur fuels, as the exclusive fuels for the combustion turbines. The proposed fuel sulfur limit for natural gas is 0.75 grains S/100 SCF, which is well below the NSPS limit. The proposed fuel sulfur limit for ULSD is 15 ppm (0.0015 percent by weight Sulfur or approximately 0.002 lbSO_2/MMBtu), which is well below the NSPS limit of 0.06 lb SO_2/MMBtu.

Sulfuric acid mist emissions are also minimized by use of low sulfur fuels. Sulfuric acid mist emissions are 0.85 lb/hr when firing natural gas and 0.70 lb/hr when firing ULSD for the combustion turbines. The Department has reviewed the SO_2 emission limitations and Sulfuric acid mist emissions and found them to be SOTA.

SO_2 controls for Ancillary Sources

WDES has proposed SO_2 emission limitations for the auxiliary boiler, emergency diesel-fired electric generator, and the emergency diesel-fired fire-water pump. The auxiliary boiler will fire natural gas only.

For the emergency diesel-fired electric generator and the emergency diesel-fired fire-water pump WDES has proposed to accept a diesel fuel oil sulfur content limit of 0.05% sulfur. The Department has reviewed the proposed emission limitation for ancillary sources and found it to be SOTA.

5. Control Technologies for Inhalable Particulate Matter (PM_{10} and $PM_{2.5}$) and Particulate Matter (PM/TSP)

a. ***Description of Control Technologies***

Particulate matter is formed from non-combustible constituents in the fuel or combustion air, or from formation of ammonium sulfates post combustion. The use of natural gas (or other low ash content fuels is regarded as BACT for PM, PM_{10}, and $PM_{2.5}$. Add-on controls are technically and economically infeasible due to the high exhaust gas flows and extremely low concentrations of particulates in the flue gas stream.

b. ***Technical Review of PM/ PM_{10} Controls***

PM/ PM_{10} controls for Combustion Turbines

WDES is proposing natural gas as the primary fuel and ULSD fuel oil as backup fuel for up to 500 hours per year per turbine. The proposed emission limits of 0.012 lb/MMBtu for PM_{10}/$PM_{2.5}$ and 0.006 lb/MMBtu for PM/TSP when firing natural gas in the combustion turbine and/or duct burner, and 0.031 lb/MMBtu for $PM_{10}/PM_{2.5}$ and 0.016 lb/MMBtu for PM when firing oil in the combustion turbine have been reviewed by the Department and found to be BACT.

PM/ PM_{10} controls for Ancillary Sources

The auxiliary boiler will fire natural gas only. For the emergency diesel engine-driven electric generator and the emergency diesel engine-driven fire-water pump WDES has proposed very low ash, ULSD oil as PM/ $PM_{10}/PM_{2.5}$ emission control. The use of very low ash fuels such as natural gas and very low ash, ULSD oil is regarded as BACT for PM_{10}, $PM_{2.5}$, and PM.

The Project includes two five cell wet mechanical cooling towers with an average water recirculation rate of 85,000 gallons per minute (gpm). Control of airborne emissions particulate matter from cooling tower drift is achieved with drift eliminators. WDES has proposed to install very high efficiency drift eliminators which will limit the drift to 0.0005% of the re-circulating water rate. At a maximum dissolved solids concentration of 4,200 ppm, the total PM_{10} from drift will be limited to an average of 0.59 lb/hr from each cooling tower or 5.18 TPY from the two cooling towers. The total $PM_{2.5}$ from drift will be limited to an average of 0.22 lb/hr from each cooling tower or 1.96 TPY from the two cooling towers. The PM from drift will be limited to 0.89 lb/hr from each cooling tower or 7.82 TPY. The Department has reviewed the proposed drift eliminator efficiency and found it to be BACT.

E. APPLICABLE REGULATIONS

1. State Regulations

Non-Attainment New Source Review (N.J.A.C. 7:27-18)

The WDES was determined to be subject to Non-attainment New Source Review (NSR) for emissions of NO_x and VOC. The WDES is subject to NSR for NO_x and VOC as the potential emissions of these two ozone precursors are greater than 25 tons per year (the threshold for severe ozone non-attainment, which applies to the entire state of New Jersey).

Applicable requirements include application of LAER technology and acquisition of emission offsets. The minimum offset ratio is 1.3:1 for both NO_x and VOC, per N.J.A.C. 7:27-18.5. The use of emission reduction credits to offset NO_x and VOC emissions must be within 100 miles for the 1.3:1 ratios to apply. WDES has indicated that it intends to acquire the required NO_x and VOC credits from sources within 100 miles of the WDES. Therefore, multiplying the potential to emit (PTE) by 1.3 results is a requirement for 394 tons per year (tpy) of NO_x (PTE = 303 tpy) offsets, and 123 tons of VOC (PTE = 94.7 tpy) offsets. These offsets must be acquired before the startup of the facility. To date, WDES has purchased 79.0 tons of VOC and 33.53 tons of NOx offsets.

In accordance with N.J.A.C. 7:27-18.3 (c) 2, WDES has conducted an analysis of alternative sites within New Jersey and considered alternative sizes, production processes, including pollution prevention measures and environmental control techniques, demonstrating that the benefits of the newly constructed WDES outweigh the environmental and social costs imposed as a result of the location, construction, and operation of the WDES. The Department has found that the benefits of the WDES will significantly outweigh the environmental and social costs imposed as a result of construction and operation of the WDES.

Other New Jersey Regulations

The facility is subject to New Jersey Air Pollution Control Regulations, codified in N.J.A.C. 7:27-1 et seq. for air pollution control, and the New Jersey Ambient Air Quality Standards (NJAAQS). The Department is satisfied that the proposed emission rates in Table 1 and Table 2 satisfy the New Jersey regulations.

2. Federal Regulations

Prevention of Significant Deterioration (PSD)

DEP has determined that the proposed project is subject to all applicable requirements of the PSD regulations codified at 40 CFR 52.21. The threshold for PSD applicability is 100 tons per year of emissions of any regulated pollutant for fossil fuel-fired steam electric plants of greater than 250 MMBTU/hr heat input. PSD applicability is determined on an individual pollutant basis. Based on the potential annual emissions in Table 2, the WDES was determined to be subject to PSD requirements for emissions of nitrogen oxides (NO_x), volatile organic compounds (VOCs), carbon monoxide (CO), particulate matter with an aerodynamic diameter less than 10 microns (PM_{10}), particulate matter with an aerodynamic diameter less than 2.5 microns ($PM_{2.5}$), and PM.

In addition to the BACT control technology requirements discussed in Section C above, the facility is required to conduct an air quality impact analysis to determine if the emissions from the project could: (1) cause or significantly contribute to a violation of a National Ambient Air Quality Standard (NAAQS) or PSD increment, (2) have an adverse impact on soils and vegetation, and (3) have an adverse impact on a PSD Class I area. The WDES is also required to analyze air quality impacts due to secondary growth.

The PSD air quality modeling analyses are discussed in detail in Section E. Briefly, the facility has demonstrated that project emissions are in compliance with the NAAQS, NJAAQS, and PSD Class I and Class II increments, and will not have an adverse impact on soils or vegetation. Secondary growth from construction or operation will not result in significant emissions.

New Source Performance Standards (NSPS)

In addition to PSD regulations codified at 40 CFR 52.21, the WDES is subject to the following NSPS codified at 40 CFR 60:

- Subpart Dc, the NSPS for industrial steam generating units greater than or equal to 10 MMBTU/hr but less than 100 MMBTU/hr (auxiliary boiler)
- Subpart Da, the NSPS for industrial steam generating units greater than 250 MMBTU/hr (duct burners),
- Subpart IIII, the NSPS for stationary CI internal combustion engine, and
- Subpart KKKK, the NSPS for stationary gas turbines.
- Subpart ZZZZ, the NSPS for area source MACT

National Emissions Standards for Hazardous Air Pollutants (NESHAPS)

In addition to PSD and NSPS regulations, the WDES is subject to the following NESHAPS codified at 40 CFR 63:

- Subpart ZZZZ, the NSPS for area source MACT

The emission limitations proposed by the WDES as shown in Table 1 and discussed in Section C satisfy the NSPS requirements.

Acid Rain Program

The Acid Rain Permit is proposed pursuant to the air pollution control permit provisions of Title IV of the federal Clean Air Act, federal rules promulgated at 40 CFR 72, and state regulations promulgated at N.J.A.C. 7:27-22. These rules require facilities operating “affected units” that are subject to the Acid Rain Program to obtain an Acid Rain Permit for those units. Pursuant to Title IV of the Clean Air Act, the United States Environmental Protection Agency (USEPA) has not previously approved sulfur dioxide allowances for the two units, Unit 1, and Unit 2, proposed for WDES. Each allowance provides authorization to emit up to one ton of sulfur dioxide during a specified calendar year. In accordance with USEPA’s rules, WDES may sell or purchase allowances on the open market in order to more accurately reflect current operation. The total number of SO_2 allowances allocated to the referenced units are as follows: Unit E102: 0, Unit E102: 0. These allocations are valid for the calendar years 2009 through 2014. The Designated Representative for this facility is Kathy French.

National Ambient Air Quality Standards

The National Ambient Air Quality Standards (NAAQS) are codified at 40 CFR 50. The dispersion modeling analysis discussed in Section E, demonstrate compliance with the NAAQS requirements.

Maximum Achievable Control Technology (MACT)

The West Deptford Energy Station will not be a major source of Hazardous Air Pollutant (HAP), including formaldehyde. Since the West Deptford Energy Station is not a major sources of HAPs, it is not subject to MACT standards. Formaldehyde would be the single HAP with highest estimated annual emission rate from WDES. WDES assumes that the formaldehyde emissions from each turbine would be 2.1 tpy from each turbine. This emission rate is equivalent to the stayed combustion turbine MACT limit of 91 ppbdv at 15% oxygen.

F. AIR QUALITY EFFECTS

The Department reviewed the ambient air quality impact of the proposed project. Based on the air quality modeling analysis, the Department found that air contaminant emissions from the proposed Facility will not exceed Federal or New Jersey Ambient Air Quality Standards or PSD increments. The source's Class I impacts at the Brigantine National Wildlife Refuge will be within allowable EPA Class I increments, and below Class I area Significant Impact Levels (SILs)

The Department also reviewed an updated Dispersion Modeling submitted by WDES for NO_2 to address the new hourly National Ambient Air Quality Standard (NAAQS) that became effective on April 12, 2010. The Dispersion Modeling shows that Nitrogen Dioxide emissions from proposed WDES will meet the new hourly National Ambient Air Quality Standard (NAAQS) of 100 parts per billion (189 $\mu g/m^3$).

The memorandum of the air dispersion modeling and risk assessment summary from Bureau of Technical Services, dated December 23, 2008, and memorandum for the Updated Dispersion Modeling for NO_2 dated May 27, 2010 is attached (Attachment).

G. TESTING AND MONITORING REQUIREMENTS

The WDES will be required to conduct stack testing to demonstrate the ability of the facility to operate within the approved emission limitations. In addition, Continuous Emission Monitors (CEM) and recorders for NO_x and CO will be required. The scope of the stack testing and CEMS is detailed in the draft compliance.

ATTACHMENT

MEMORANDUM OF THE AIR DISPERSION MODELING AND RISK ASSESSMENT SUMMARY DATED DECEMBER 23, 2008, AND,
MEMORANDUM FOR THE UPDATED DISPERSION MODELING FOR NO_2 DATED MAY 27, 2010.

Division of Air Quality
Bureau of Technical Services
Air Quality Evaluation Section
P.O. Box 027
Trenton, New Jersey 08625

M E M O R A N D U M

TO: Lou Mikolajczyk, Chief
Bureau of Preconstruction Permits

December 23, 2008

FROM: John Jenks, Chief
Bureau of Technical Services

SUBJECT: West Deptford Energy, LLC
West Deptford Township, Gloucester County
Air Dispersion Modeling and Risk Assessment Summary

Plant ID: 56078
Application #: PCP080001

The Bureau of Technical Services (BTS) has completed its review of the West Deptford Energy's air modeling submittals. These submittals include the Class II Air Dispersion and Multisource Modeling Report (dated December 2008) and the Long Range Transport Air Quality and AQRV Impact Assessment (dated November 25, 2008). BTS has determined that the proposed West Deptford Energy Station will comply with all National and New Jersey Ambient Air Quality Standards, as well as the Class I and Class II Prevention of Significant Deterioration (PSD) increments. In addition, the modeling has predicted no exceedances of NJDEP's cancer and non-cancerous health guidelines due to its emissions of hazardous air pollutants. Attached is a summary of the air dispersion modeling and risk assessment review. If there are questions regarding the air quality impact analysis, please contact Greg John at (609) 633-1106.

Attachment

c: Alan Dresser
Greg John
Yogesh Doshi
Aliya Khan

Air Dispersion Modeling of West Deptford Station December 2008

CONCLUSION

BTS has determined that the proposed West Deptford Energy Station will comply with all National and New Jersey Ambient Air Quality Standards, as well as the Class I and Class II Prevention of Significant Deterioration (PSD) increments. In addition, the modeling has predicted no exceedances of NJDEP's cancer and non-cancerous health guidelines due to its emissions of hazardous air pollutants.

PROJECT DESCRIPTION

West Deptford Energy LLC (WDE) is proposing to construct a 600 megawatt (MW) dual-fuel combined-cycle plant on approximately 300-acre site in West Deptford Township, Gloucester County. The facility will be comprised of two combustion turbines, two heat-recovery steam generators, a steam turbine generator, one 40 MMBtu/hr natural gas-fired auxiliary boiler, one 750 kW backup diesel emergency generator, one 300 HP diesel firewater pump, and two multi-cell cooling towers. Each combustion turbine will fire natural gas, with ultra low sulfur diesel fuel oil as back-up fuel for up to 500 hours per year. Neighboring properties are primarily heavy industry and chemical firms. The Delaware River borders the property on the north, the Gloucester County Utilities Authority on the west, U.S. Route 130 to the south, and Little Mantua Creek to the east. WDE plans to use GCUA's Publicly-Owned Treatment Works effluent discharge as process water at the facility – each cooling tower will circulate 85,000 gallons per minute of grey water.

WDE FACILITY EMISSIONS PER YEAR

A number of emission scenarios have been outlined to justify annual emission limits. The combustion turbines will fire natural gas for a maximum of 6,900 hours (assuming no dust burner or oil firing), and another scenario involves 500 hours of ultra low sulfur oil-firing of the combustion turbines, including 150 hours of oil-fired start-up/shutdown operation, and 5,600 hours of natural gas-firing. Table 1 list the facility emission in tons per year for each criteria pollutant and PSD pollutants, and several Hazardous Air Pollutants. The facility will also emit ammonia, arsenic, hexane, manganese, and selenium.

Table 1. WDE Potential Emissions and Significance Thresholds

	Facility Potential-to-Emit (TPY)	PSD Significant Emissions Thresholds [a] (TPY)
Carbon Monoxide	703.16	100
Nitrogen Dioxide	302.74	40/25 [b]
Particulate Matter (TSP)	58.39	25
Particulate Matter (PM-10)	99.33	15
Particulate Matter (PM-2.5)	96.12	100
Sulfur Dioxide	35.38	40
Lead	0.017	0.6
VOCs	94.69	40/25 [b]
Sulfuric Acid Mist	5.3	7
Acrolein	0.0317	0.004
1,3-Butadiene	0.024	0.007
Formaldehyde	1.22	0.2
Toluene	2.3	1

a. PSD significant emissions thresholds are equivalent to the Subchapter 18 values unless noted.
b. Represents Subchapter 18 significant emission increase threshold.

STACK PARAMETERS

Table 2 lists the location and source parameters of the stacks modeled at the proposed facility. The sources include two combustion turbines (CTG4 & CTG3), an auxiliary boiler, and 10 cooling tower cells (CT2A through CT4E). The exit velocity for the combustion turbines under start-up/shutdown operation will be 10.1 meters/second.

Table 2. Source Location and Stack Parameters Modeled at WDE Station

SOURCE ID	X (METERS)	Y (METERS)	BASE ELEV. (METERS)	STACK HEIGHT (METERS)	STACK TEMP. (DEG.K)	STACK EXIT VEL. (M/SEC)	STACK DIAMETER (METERS)
CTG4	481100.3	4409984	4.3	64.0	345.40 [a]	11.76 [b]	5.49
CTG3	481060.7	4409984	4.3	64.0	345.40 [a]	11.76 [b]	5.49
AUXBLR2	481035.7	4409957	4.3	38.1	627.60	26.67	0.61
CT4A	481035.4	4410050.5	4.3	18.59	294.26	9.06	10.36
CT4B	481051.6	4410050.5	4.3	18.59	294.26	9.06	10.36
CT4C	481067.9	4410050.5	4.3	18.59	294.26	9.06	10.36
CT4D	481084.2	4410051	4.3	18.59	294.26	9.06	10.36
CT4E	481100.5	4410051	4.3	18.59	294.26	9.06	10.36
CT2A	481035.2	4410070	4.3	18.59	294.26	9.06	10.36
CT2B	481051.5	4410070.5	4.3	18.59	294.26	9.06	10.36
CT2C	481067.8	4410070.5	4.3	18.59	294.26	9.06	10.36
CT2D	481084.1	4410070.5	4.3	18.59	294.26	9.06	10.36
CT2E	481100.4	4410070.5	4.3	18.59	294.26	9.06	10.36

a. Combustion turbine stack exit temperature represents 100 load w/ duct burner n.g. firing.
b. Combustion turbine stack exit velocity represent 50 percent load oil firing.

CRITERIA POLLUTANT MODELED EMISSION RATES

Table 3 lists the worst-case emissions modeled to determine significance and demonstrate compliance with ambient air quality standards. Emission rates are listed for each source type at the proposed facility, and, in the case of the combustion turbines, separate emission rates for firing natural gas, low sulfur oil, and start-up/shutdown operation. The emission rates listed under natural gas firing and oil firing represent 100 percent load. Since WDE may provide intermediate and peak demand power, it is anticipated that the facility will have frequent start-up and shutdowns. Start-up operation will take a maximum of five hours, while shutdown is estimated at one hour. Carbon monoxide and nitrogen dioxide emissions will be greater during start-up and shutdown than during normal base operation.

Table 3. West Deptford Energy Source Emissions (lb/hr)

Pollutant	Combustion Turbine (each)			Auxiliary Boiler	Cooling Tower (each cell)
	Natural gas Firing	Oil Firing	Start-up /Shutdown		
Carbon Monoxide (CO)	13.95	18.03	1950/438[1]	1.44	--
Nitrogen Oxides (NO_2)	18.42	34.55	436	1.4	--
Sulfur Dioxide (SO_2)	5.66	4.64	2.98	0.024	--
Particulate Matter (TSP)	17	17	17	0.2	0.178
Particulate Matter (PM-10)	18.66	34	34	0.2	0.118
Particulate Matter (PM-2.5)	18.66	34	34	0.2	0.045

1 The 1-hour average emission rate = 1950 lb/hr; 8-hour average emission rate = 438 lb/hr

An annualized average emission rate of 33.87 lb/hr was used to predict the annual NO_2 impacts. This annualized NOx emission rate reflects the limits on annual turbine operations during normal operations and the NOx emissions during startup and shutdown. An annualized average of 10.69 lb/hr was used to predict the annual PM-2.5 and PM-10 impacts.

BACKGROUND AIR QUALITY

Table 4 shows the background concentrations at representative background monitoring stations.

Table 4. Background Air Quality (µg/m^3)

Pollutant	Averaging Time[1]	Monitoring Station	2004	2005	2006
NO_2	Annual	Camden Lab	37.6	39.5	32.0
	1-hour	Camden Lab	139.1	156.0	126.0
SO_2	Annual	Clarksboro	10.5	13.1	7.9
	3-hour	Clarksboro	36.7	60.3	39.3
	24-hour	Clarksboro	76.0	335.4	86.5
CO	1-hour	Camden Lab	3320	3435	1946
	8-hour	Camden Lab	4237	4465	3091
PM-10	Annual	Camden Lab	20.8	25	20

	24-hour	Camden Lab	49	50	38
PM-2.5[2]	Annual	Gibbstown	12.1		
	24-hour	Gibbstown	29.3		

1 Annual concentrations represent the maximum calendar year concentration. Short-term concentrations are highest, second-highest concentrations.
2 PM-2.5 background concentrations are based on the 3-year average 98th percentile from 2005 through 2007.

MODELING METHODOLOGY

The AERMOD Air Dispersion Model (version 07026) was used to model emissions from the facility. Five years of surface observations (1990-1994) from Philadelphia International Airport and concurrent upper air data from Dulles International Airport were used. A profile base elevation of 9 meters was used. Rural dispersion coefficients were assumed and directional dependent downwash dimensions were developed using the Building Profile Input Program (version 95086).

A Cartesian Grid of receptors was modeled. Receptors were placed at 50-meter intervals around the plant property, and at every 100 meters in a grid out to a distance of 5 kilometers, at every 250 meters from 5 to 7.5 kilometers, and at every 500 meters from 7.5 out to 10 kilometers. Air dispersion concentrations were calculated at as many as 55,171 receptors. Terrain features were modeled for each receptor.

WDE FACILITY MODELING RESULTS

Table 5 presents the results of the significant modeling. The single-source modeling of the proposed facility's CO, NO_2, PM-10 and PM-2.5 emissions predicts that only the 24-hour PM-10 and PM-2.5 concentrations will exceed their Significant Impact Levels (SILs). Thus, in addition to comparing the WDE Facility's emission impacts to ambient air quality standards and PSD increments, a cumulative evaluation of PM-10 emissions from the facility's sources and nearby existing sources was required for comparison to the National Ambient Air Quality Standard (NAAQS) and the Class II PSD Increment. It should be noted that SO_2 impacts were obtained by scaling the allowable emission rates and the annual NO maximum impact, the 24-hour PM-10 impact, and, conservatively, the 1-hour CO impact. Because of its low emission rate, SO_2 impacts were not evaluated during startup/shutdown.

Table 5. WDE Significant Impact Analysis

Pollutant	Averaging Period	Class II Significant Impact Level ($\mu g/m^3$)	Worst-Case Operating Scenario		Start-up/Shutdown Scenario	
			Maximum Impact Concentration ($\mu g/m^3$)	Significant Impact Distance	Maximum Impact Concentration ($\mu g/m^3$)	Significant Impact Distance
CO	1-hour	2000	10.1	< SIL	900	< SIL
	8-hour	500	5.1	< SIL	119	< SIL
NO_2	Annual	1	0.75	< SIL	NA	NA
SO_2	Annual	1	0.09	< SIL	NA	NA
	24-hour	5	1.0	< SIL	--	--
	3-hour	25	3.0	< SIL	--	--

PM-10	Annual	1	0.32	< SIL	0.32	< SIL
	24-hour	5	5.8	~1.2 km	6.5	~1.3 km
PM-2.5	Annual	0.3	0.24	< SIL	0.13	< SIL
	24-hour	1.2	5.6	~4.7 km	6.3	~5.1 km

Table 6 shows the comparison of WDE's impact concentrations to National and New Jersey Ambient Air Quality Standards and the Class II PSD increments. The highest, second-high 24-hour average PM-10 concentration was conservatively used to show compliance with the 24-hour PM-10 standard and, the highest, eighth highest average 24-hour PM-2.5 concentration was used to show compliance with the 24-hour PM-2.5 standard. In actuality, regulatory compliance with the 24-hour PM-10 standard is based on the highest sixth highest predicted 24-hour average concentration over a five year period, and the 24-hour PM-2.5 standard is based on the three-year average 98th percentile.

Table 6. WDE Maximum Impacts Compared to Ambient Air Quality Standards

Pollutant	Averaging Period	Maximum Impact Conc. ($\mu g/m^3$)	Class II PSD Increment ($\mu g/m^3$)	Background Concentration ($\mu g/m^3$)	Total Impact Concentration ($\mu g/m^3$)	NAAQS/ NJAAQS ($\mu g/m^3$)
CO	1-hour	822.6[1]	--	4,465	5,288	40,000
	8-hour	468[1]	--	3,435	3,903	10,000
NO_2	Annual	0.78	25	39.5	40.28	100
	1-hour	201.8	--	156	358	470[1]
SO_2	Annual	0.09	20	13.1	33.1	80/60
	24-hour	1.0	91	60.3	151.3	365/260
	3-hour	3.0	512	335.4	847.4	1300
PM-10	Annual	0.32	17	25	25.3	50[3]
	24-hour	6.3[2]	see Table 8	50	56.3	150
PM-2.5	Annual	0.24	--	12.1	12.3	15
	24-hour	4.3[3]	--	29.3	33.6	35

1 New Jersey 1-hour guideline.
2 Highest, second-high concentration.
3 Highest, eighth-highest concentration.

MULTISOURCE MODELING RESULTS

Multisource modeling of PM-10 emissions from the facility and nearby sources demonstrated compliance with the 24-hour PM-10 NAAQS and 24-hour Class II PSD Increment. Nearby sources were defined as sources within a radius around the facility equal to the furthest distance of the significant impact plus 50 kilometers. The multisource modeling area includes portions of New Jersey, Pennsylvania (including Philadelphia), Maryland, and Delaware. Two multisource inventories were modeled - one inventory representing nearby sources and allowable emissions for compliance with the NAAQS, and the second inventory including PSD increment consumers and expanders. There were no PM-10 sources in the small portion of Northeast Maryland located within the modeling radius, and the PM-10 impacts for the Delaware sources were predicted to be below significance levels within the modeling area radius. In Table 7, the highest, second highest predicted 24-hour PM-10 concentrations from the five individual years of meteorological data was compared to the 24-hour PM-10 NAAQS of

150 $\mu g/m^3$. And, Table 8 shows that the highest, second highest predicted 24-hour PM-10 concentration from the five individual years of PSD inventory modeling will be below the Class II increment of 30 $\mu g/m^3$. WDE's annual NO_2 impact of 0.78 $\mu g/m^3$ is below the Class II Significance Level of 1 $\mu g/m^3$ and Class II Increment of 25 $\mu g/m^3$.

Table 7. Comparison of the PM-10 Multisource Modeling Impacts to the NAAQS

Pollutant	Averaging Period	Maximum Multisource Impact ($\mu g/m^3$)	Background Concentration ($\mu g/m^3$)	Total Impact Concentration ($\mu g/m^3$)	NAAQS ($\mu g/m^3$)
PM-10	24-hour	22.1	50	72.1	150

Table 8. Comparison of the PM-10 Multisource Modeling Impacts to the PSD Class II Increment

Pollutant	Averaging Period	Maximum Multisource Impact ($\mu g/m^3$)	PSD Class II Increment ($\mu g/m^3$)
PM-10	24-hour	20	30

BRIGANTINE CLASS I AREA ANALYSIS

The impacts of the WDE project on the Class I PSD increments and the Air Quality Related Values (AQRVs) at the Brigantine-Edwin B. Forsythe National Wildlife Refuge Class I area were evaluated using the CALMET/CALPUFF modeling system (version 5.8, level 070623). The basic guidance contained in the Federal Land Managers' Air Quality Related Values Workgroup (FLAG, 2000) and the Interagency Workgroup on Air Quality Modeling Phase II (IWAQM) was followed. The Class I area modeling analysis is described in detail in WDE's submittal entitled *Final Report – Long Range Transport Air Quality and AQRV Impact Assessment for the West Deptford Energy Station* (November 25, 2008).

The Brigantine-Edwin B. Forsythe National Wildlife Refuge is located 75.2 km to the east-southeast of the proposed facility. The CALMET/CALPUFF modeling domain extended 312 km east-west and 212 km north-south. Three years (2001-2003) of meteorological data was generated with CALMET using the following meteorological inputs: 12 km MM-5 data from the VISTAS domain, 19 surface meteorological stations, 2 upper air stations, and 2 ocean buoys. CALMET was run with two grid resolutions, 1 km and 4 km with a coastline subgrid. A total of 44 receptors were placed at the locations recommended by the National Park Service and Fish and Wildlife Service.

Table 9 and 10 list the maximum predicted impacts at the Class I area for both the natural gas and oil firing scenarios. The annual concentrations contained in the WDE Class I modeling report were increased by 50 percent to reflect allowable annual emissions, not typical operations. As can been seen in Tables 9 and 10, all predicted impacts are well below both the significance levels and Class I PSD increments.

Table 9. CALPUFF estimated pollutant concentration impacts at Brigantine NWR (Natural Gas fired operations)

Pollutant and Averaging Time	CALPUFF at Class 1 Areas [a,b] (2001-2003)			
	Class I Area Proposed SIL ($\mu g/m^3$)	**Brigantine 4km w/Coastline**	**Brigantine 1 km**	**Class I PSD Increments ($\mu g/m^3$)**
SO_2 Annual	0.10	0.001	0.001	2
SO_2 24-Hour	0.20	0.013	0.012	5
SO_2 3-Hour	1.00	0.041	0.035	25
PM10 Annual	0.20	0.006	0.006	4
PM10 24-Hour	0.30	0.061	0.056	8
NO_2 Annual	0.10	0.01	0.01	2.5

a. Highest second high at any monitor in the Class I area.
b. Highest impacts predicted in 2003.

Table 10. CALPUFF estimated pollutant concentration impacts at Brigantine NWR (Oil-fired Operation)

Pollutant and Averaging Time	CALPUFF at Class I Areas[a,b] (2001-2003)			
	Class I Area Proposed SIL ($\mu g/m^3$)	**Brigantine 4km w/Coastline**	**Brigantine 1 km**	**Class I PSD Increments ($\mu g/m^3$)**
SO_2 24-Hour	0.20	0.011	0.010	5
SO_2 3-Hour	1.00	0.033	0.029	25
PM10 24-Hour	0.30	0.091	0.085	8

a. Highest second high at any monitor in the Class I area.
b. Highest impacts predicted in 2003.

An analysis of the project's impact on the AQRVs at the Brigantine-Edwin B. Forsythe National Wildlife Refuge was also conducted. For the visibility modeling, PM-10 emissions were speciated as elemental carbon, organic carbon, PM-2.5, sulfate, or coarse particulate. Under natural gas firing the greatest daily extinction reduction predicted was 4.05 percent. In Table 11 are the maximum daily extinction reductions predicted for oil-firing. Only one day in the three years modeled was the 5 percent threshold exceeded. Sulfur and nitrogen deposition at the Class I area were predicted to be well below the levels of concern.

Table 11. CALPUFF estimated maximum daily extinction estimates at Class I areas using 1 km CALMET meteorological fields (oil-firing)

	Class I Area Visibility Impacts		
	# Days > 5%	**# Days > 10%**	**Max Change (%)**
Brigantine NWR			
2001	0	0	3.60
2002	0	0	2.69
2003	1	0	5.49

RISK ASSESSMENT RESULTS

Air dispersion modeling and risk assessment demonstrates that HAP emissions will be within cancer and health guidelines. Table 12 lists the long-term cancer and non-cancer risks from WDE's HAP emissions. Table 13 lists the acute risks from WDE's HAP emissions.

Table 12. WDE Long-Term Cancer and Non-Cancer Risks

Hazardous Air Pollutant	Maximum Predicated Annual Concentration ($\mu g/m^3$)	Unit Risk Factor $(\mu g/m^3)^{-1}$	Incremental Risk
Arsenic	0.00001	4.3E-03	4.3E-08
Butadiene (1,3-)	0.0049	3.0E-05	1.5E-07
Formaldehyde	.03	1.3E-05	3.9E-07
Lead	.00001	1.2E-05	1.2E-10
Hazardous Air Pollutant	Maximum Predicated Annual Concentration ($\mu g/m^3$)	Reference Concentration ($\mu g/m^3$)	Hazard Quotient
Acrolein	.0003	0.02	0.02
Arsenic	.0002	0.03	0.07
Butadiene (1,3-)	0.0049	2	0.01
Formaldehyde	0.65	3	0.22
Hexane (n-)	0.41	700	0.001
Manganese	0.01	0.05	0.2
Selenium	0.0003	20	0.001
Sulfuric Acid	0.345	1	0.35
Toluene	0.12	300	0.001

Table 13. WDE Acute Health Risks

Hazardous Air Pollutant	Maximum Predicted 1-Hour Concentration ($\mu g/m^3$)	Short-Term Reference Concentration ($\mu g/m^3$)	Hazard Quotient
Acrolein	0.006	0.19	0.03
Arsenic	0.0002[1]	0.19[1]	0.01
Formaldehyde	0.653	94	0.01
Lead	0.00005[2]	0.1[2]	0.0005
Sulfuric Acid	0.016	120	0.0001
Toluene	0.12	37000	0.00001

1 4-hour average concentration.
2 24-hour average concentration.

State of New Jersey

CHRIS CHRISTIE
Governor

DEPARTMENT of ENVIRONMENTAL PROTECTION

BOB MARTIN
Commissioner

Division of Air Quality
Bureau of Technical Services
Air Quality Evaluation
401 E. State Street, 2nd floor, P.O. Box 27
Trenton, NJ 08625-0027

May 27, 2010

MEMORANDUM

TO: Bachir Bouzid, Section Chief
Bureau of Air Permits

FROM: Joel Leon, Section Chief
Bureau of Technical Services

SUBJECT: West Deptford Energy, LLC
Updated Dispersion Modeling for Nitrogen Dioxide (NO_2)

Plant ID: 56078
Permit No.: PCP080001

On April 12, 2010, the new hourly 1-hour nitrogen dioxide (NO_2) National Ambient Air Quality Standard (NAAQS) of 100 parts per billion (189 $\mu g/m^3$) became effective. As a result, all air permits issued after that date need to address this new NAAQS. Therefore, as part of their PSD permit renewal, West Deptford Energy Station must show compliance with the 1-hour NO_2 NAAQS.

The Bureau of Technical Services has completed its review of the Updated Dispersion Modeling for NO_2, dated May 12, 2010, submitted by the applicant. During normal operations, the facility's 8th highest (98th percentile) 1-hour maximum concentration averaged over five years is 8.1 $\mu g/m^3$. When added to the average 1-hour NO_2 background value from Camden, the total impact of 113 $\mu g/m^3$ complies with the NAAQS. During startup operations, the facility's 8th highest (98th percentile) 1-hour maximum concentration averaged over five years is 60.2 $\mu g/m^3$. When added to the average 1-hour NO_2 background value from Camden, the total impact of 165 $\mu g/m^3$ complies with the new NAAQS. A brief summary of the additional modeling evaluation is attached. If there are any questions regarding the updated NO_2 dispersion modeling, please contact Greg John at (609) 633-1106.

Attachment

c: Alan Dresser
Yogesh Doshi
Greg John
Aliya Khan

West Deptford Energy Station
Updated Air Dispersion Modeling for Comparison to the 1-Hour Nitrogen Dioxide NAAQS
May 2010

CONCLUSION

Nitrogen Dioxide emissions from proposed West Deptford Energy (WDE) Station will meet the new hourly National Ambient Air Quality Standard (NAAQS) of 100 parts per billion (189 µg/m^3). During normal operations, the facility's 8th highest (98th percentile) daily 1-hour maximum concentration averaged over five years is 8.1 µg/m^3. No multisource modeling was required because this value is below the NESCAUM interim 1-hour NO_2 significant impact level of 10 µg/m^3. When added to a the average 1-hour NO_2 background value from Camden, the total impact of 113 µg/m^3 complies with the NAAQS. During startup/shutdown operations, the facility's 8th highest (98th percentile) daily 1-hour maximum concentration averaged over five years is 60.2 µg/m^3. As a general rule, BTS does not require multisource modeling when start-up/shutdown impacts exceed a significant impact level. When added to the average 1-hour NO_2 background value from Camden, the total start-up/shutdown impact of 165 µg/m^3 complies with the new NAAQS.

DESCRIPTION

The updated dispersion modeling was based on air dispersion modeling previously submitted to and approved by the Department (see BTS memo dated December 23, 2008). The previous dispersion modeling added the maximum 1-hour NO_2 impact to the highest, second-high background for comparison to the Department's 1-hour NO_2 guideline value of 470 µg/m^3 . However, the U.S. EPA established a new 1-hour NAAQS of 100 parts per billion (189 µg/m^3) for NO_2. A conservative comparison of the 8th highest start-up/shutdown impact concentration assuming a 75% NO_2 to NOx ratio (106 µg/m^3) added to the highest, second-high 1-hour background concentration (126 µg/m^3) did not demonstrate compliance with the new 1-hour National Ambient Air Quality Standard (NAAQS). Thus, the case-by-case Plume Volume Molar Ratio Method (PVMRM) technique was implemented to determine the appropriate NO_2 impacts and demonstrate compliance with the new 1-hour NO_2 NAAQS.

METHODOLOGY

Raw hourly NO_2 monitoring data from the Camden monitor from 2006 through 2008 was analyzed to find the average of the 8th highest daily 1-hour maximum concentration averaged over three years (105 µg/m^3). The AERMOD (version 09292) model was used to calculate the 8th highest daily 1-hour concentration at each receptor for each of the five years of meteorological data modeled. Post-processing was applied on these 5 sets of 1-hour data to calculate the 98th percentile among an annual distribution of the 365 daily maximum 1-hour concentrations. The Plume Volume Molar Ratio Method (PVMRM) was applied with a highest 1-hour high ambient background ozone concentration of 0.126 parts per million, a NO_2/NOx ratio of 0.75, and in stack ratio of NO_2/NOx of 0.1. Tables 1 and 2 lists the stack parameters modeled for normal and start-up/shutdown operation. Start-ups will take a maximum of five hours, while shutdown is estimated at one hour.

Table 1. Source Parameters Modeled at WDE Station for Normal Operation

Source	X (meters)	Y (meters)	NO2 Emission Rate (lb/hr)	Base Elevation (meters)	Stack Height (meters)	Stack Temp. (Deg.K)	Stack Exit Vel. (m/s)	Stack Diameter (meters)
CTurbineG4	481100.3	4409984	34.55	4.3	64.0	345.40 [a]	11.76 [b]	5.49
CTurbineG3	481060.7	4409984	34.55	4.3	64.0	345.40 [a]	11.76 [b]	5.49
AUXBoiLeR2	481035.7	4409957	1.4	4.3	38.1	627.60	26.67	0.61

a. Combustion turbine stack exit temperature represents 100% load w/dust burner firing natural gas.
b. Combustion turbine stack exit velocity represents 50% load firing oil.

Table 2. Source Parameters Modeled at WDE Station for Start-up/Shutdown

Source	X (meters)	Y (meters)	NO_2 Emission Rate (lb/hr)	Base Elevation (meters)	Stack Height (meters)	Stack Temp. (Deg.K)	Stack Exit Vel. (m/s)	Stack Diameter (meters)
CTurbineG4	481100.3	4409984	436	4.3	64.0	345.40 [a]	10.1	5.49
CTurbineG3	481060.7	4409984	436	4.3	64.0	345.40 [a]	10.1	5.49
AUXBoiLeR2	481035.7	4409957	1.4	4.3	38.1	627.60	26.67	0.61

a. Combustion turbine stack exit temperature represents 100% load w/dust burner firing natural gas.

MODELING RESULTS

The maximum predicted 1-hour NO_2 concentration during normal operation of West Deptford Energy (WDE) complies with the newly promulgated 1-hour NAAQS when following the tier 2 (75% NO_2 to NOx ratio) guidance. The maximum predicted 1-hour NO_2 concentration for start-up/shutdown at WDE, following a tier 3 refined analysis, is below the newly promulgated 1-hour NO_2 NAAQS. Table 3 shows the results of the different operating scenarios modeled.

Table 3. Updated NO_2 Modeling for WDE Station

Scenario	1-Hour NO_2 Impact Concentration ($\mu g/m^3$)	1-Hour NO_2 Background Concentration ($\mu g/m^3$)	Total 1-Hour NO_2 Impact Concentration ($\mu g/m^3$)	1-Hour NO_2 NAAQS ($\mu g/m^3$)
Normal Operation	8.1 [a]	105 [c]	113.1	189
Start-up/Shutdown	60.2 [b]	105 [c]	165.2	189

a. 8^{th} highest NO_2 impact represents 75% NO_2 to NOx ratio (tier 2).
b. Uses the PVMR Method in AERMOD for converting NO to NO_2 (tier 3).
c. 1-hour NO_2 background value represents highest 8^{th} high concentration.